

Dam ID: HI-0011  
All Reservoir

**Vulnerability Index:**  
Extreme High Moderate Low  
1 2 3 4

Inspection No: \_\_\_\_\_  
Date: 3/20/2006

STATE OF HAWAII - DLNR  
VISUAL DAM SAFETY INSPECTION SHEET

Inspection Type: Visual Dam Safety Inspection

| Persons Present       | Affiliation                  | Phone Number |
|-----------------------|------------------------------|--------------|
| <u>Al Satogata</u>    | <u>State of Hawaii, DLNR</u> | <u></u>      |
| <u>Max Manera</u>     | <u>AJAR, Inc.</u>            | <u></u>      |
| <u>Henri Mulder</u>   | <u>Corps of Engineers</u>    | <u></u>      |
| <u>Galen Kawakami</u> | <u>DLNR</u>                  | <u></u>      |
| <u>Craig Koga</u>     | <u>DLNR</u>                  | <u></u>      |

**Weather Condition:** ☐ Rain previous day ☐ Rainy ☐ Drizzle / Mist ☐ Cloudy/Overcast ☐ Partly Cloudy ☒ Sunny ☒ Dry

Comments: \_\_\_\_\_

**1. General:** *(Information currently on file, update as required)*

|                  |   |               |                             |
|------------------|---|---------------|-----------------------------|
| Dam/Res. Name    | <u>All RESERVOIR</u>                    |               |                             |
| Owner            | <u>Grove Farm Company</u>               | <u>(C009)</u> |                             |
| Owner Contact    | <u>Mr. Adam Killerman</u>               | Owner Ph.     | <u></u>                     |
| Lessee           | <u></u>                                 | Lessee Ph.    | <u></u>                     |
| O & M Contractor | <u>AJAR, Inc. Adam Killerman</u>        | O & M Ph.     | <u></u>                     |
| Nearest City     | <u>KAPAIA</u>                           | Latitude      | <u>22.0217</u> ° (decimal)  |
| County           | <u>KAUAI</u>                            | Longitude     | <u>159.3833</u> ° (decimal) |
| Tax Map Key(s)   | <u>(4)3-9-002:002 &amp; 3-8-002:002</u> |               |                             |

|                       |                  |                  |                  |                   |               |
|-----------------------|------------------|------------------|------------------|-------------------|---------------|
| Dam Status            | <u>A:</u>        | Hazard Potential | <u>L:</u>        | Dam Size          | <u></u>       |
| Year Completed        | <u>1920</u>      | Dam Length       | <u>350</u> ft.   | Dam Height        | <u>20</u> ft. |
| Normal Storage        | <u>68</u> ac.ft. | Max. Storage     | <u>68</u> ac.ft. | Max. Surface Area | <u></u> ac.   |
| Offsite Drainage Area | <u></u> mi.      | Spillway Type    | <u></u>          | Max. Spillway Q   | <u></u> cfs   |

Owner owns land under dam facility: \_\_\_\_\_

Emergency Action Plan on file with the Department: NO

Reports on file with the Department: \_\_\_\_\_

| 2. Questions for Owner's Rep.:  | Yes                      | No                       | Unknown                  | Comments  |
|---------------------------------|--------------------------|--------------------------|--------------------------|---|
| Construction Plans Available    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |   |
| Site / Facility Map             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |   |
| Operation & Maintenance Manual  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |   |
| Emergency Action Plan           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |   |
| Modifications / Improvements    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |   |
| Conduct Routine Inspections     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |   |
| Conduct Routine Maintenance     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |   |
| Vehicle access to site          | X                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> Not accessible <input type="checkbox"/> With Standard car    X Requires 4-Wheel Drive  |
| Access during heavy rains       | X                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> Not accessible <input type="checkbox"/> With Standard car    X Requires 4-Wheel Drive  |
| Access when spillway is flowing | X                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> Not accessible <input type="checkbox"/> With Standard car    X Requires 4-Wheel Drive  |
| Other Studies Conducted         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> Phase I <input type="checkbox"/> Phase II <input type="checkbox"/> Hydraulics <input type="checkbox"/> Stability <input type="checkbox"/> Hazard <input type="checkbox"/> Seismic<br><input type="checkbox"/> Other: _____                         |
| Incident History                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> Breached <input type="checkbox"/> Overtop <input type="checkbox"/> Slide <input type="checkbox"/> Down stream Flooding<br><input type="checkbox"/> Other: _____  |
| Reservoir's Current Use         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> Sediment <input type="checkbox"/> Irrigation <input type="checkbox"/> Recreation <input type="checkbox"/> Flood Control <input type="checkbox"/> Drinking Water<br><input type="checkbox"/> Power Generation <input type="checkbox"/> Other: _____ |

### Findings and Corrective Actions:

- ☐ a. The Owner shall maintain documentations including Construction plans, specifications, improvements, modifications, Operations and Maintenance Manuals and routine inspection logs for this dam facility.
- ☐ b. An Emergency Action Plan (EAP) is on file with the department, submit any updates as applicable.
- ☐ c. An EAP is required for High Hazard Dams. Submit an updated EAP for this facility.
- ☐ d. An EAP is recommended for all dams regardless of hazard class. Submit EAP if developed for the facility.
- ☐ e. Submit narrative and additional information detailing the improvements, modifications, and/or alterations at the dam site, unless covered by approved dam permit.
- ☐ f. Routine inspection logs were not inspected.
- ☐ g. Dam owners shall provide for routine inspection of the dam.
- ☐ h. The dam did not appear to be maintained on a regular basis.
- ☐ i. Access to site appears to be satisfactory.
- ☐ j. There is no vehicular access to the dam site. Operational and emergency plans need to reflect this deficiency or access provided.
- ☐ k. Access to dam is questionable during severe weather conditions and/or spillway overflows. Operational plans and emergency plans need to reflect this deficiency or access provided.
- ☐ l. Provide a detailed narrative of the incident, responses taken, and any damages incurred. Dam owners are required to promptly advise the department of any sudden or unprecedented flood or unusual or alarming circumstance or occurrences which may adversely affect the dam or reservoir.
- ☐ m. Submit current Operations and Maintenance Manual or Procedures for this dam / reservoir facility.
- ☐ n. Submit Site or Facility Map of this Dam which identifies the location of major features including outlet works controls and conduits.
- ☐ o. \_\_\_\_\_

### Additional Requirements:

The following investigative study(s) are:

| Required                 | Recommended              |  |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Phase I Study  |
| <input type="checkbox"/> | <input type="checkbox"/> | Phase II Study (Including <input type="checkbox"/> Seepage <input type="checkbox"/> Hydrology/Hydraulics <input type="checkbox"/> EAP) |
| <input type="checkbox"/> | <input type="checkbox"/> | Hydrology and Hydraulics (including Probable Maximum Flood and spillway capacity)  |
| <input type="checkbox"/> | <input type="checkbox"/> | Stability Analysis   |
| <input type="checkbox"/> | <input type="checkbox"/> | Seismic Analysis   |
| <input type="checkbox"/> | <input type="checkbox"/> | Hazard Classification  |
| <input type="checkbox"/> | <input type="checkbox"/> | Other: _____   |

**Physical Dam Features:** (Check All Applicable. Provide description of Items Observed and/or Take Photos. Indicate photo # in description.)

### 3. Reservoir:

Level during inspection 21 ft per \_\_\_\_\_ (gage / other) Max 23' last week

Normal Operating Level/Range 13 ft per \_\_\_\_\_ (gage / other)

Description: \_\_\_\_\_

Typical Operation ☐ Spillway always flowing ☐ Kept within normal range ☐ Kept Empty ☐ Drained Daily ☐ Only filled by Storms

☐ Other: \_\_\_\_\_

Sinkhole in Res.: ☐ # Observed: \_\_\_\_\_ Size: \_\_\_\_\_ by \_\_\_\_\_ in. Deep ☐ Not Visible ☐ None Observed

Description: \_\_\_\_\_

Staff Gage: Description: \_\_\_\_\_

#### Findings:

- ☒ a. The reservoir was not inspected.
- ☐ b. The reservoir appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☐ c. The reservoir appeared to be in fair to poor condition and requires corrective action.
- ☐ d. The reservoir appeared to be in unsatisfactory condition, urgent corrective action is required.

#### Corrective Actions:

- ☐ e. The staff gage needs maintenance and/or repair. Description: \_\_\_\_\_
- ☐ f. A staff gage was not observed at the reservoir. Provide some method of quantifying the water level within the reservoir.
- ☐ g. A sinkhole was observed in the upstream reservoir. Conduct additional investigations and monitoring to identify the cause, risk and appropriate action.
- ☐ h. \_\_\_\_\_

### 4. Intake Works Description:

☐ Number of Intakes \_\_\_\_\_

☐ Intake Culvert / Pipe

Size: \_\_\_\_\_ in. ☐ DIP ☐ Corrugated Metal ☐ PVC ☐ HDPE ☐ Concrete ☐ Other \_\_\_\_\_

Control: ☐ Gate ☐ Valve ☐ Flow can either be Shut off or Bypassed

From: ☐ Stream Diversion ☐ Pump ☐ Reservoir ☐ Other \_\_\_\_\_

☐ Ditch / Flume

Dimension: \_\_\_\_\_ (Size x Depth) Shape \_\_\_\_\_

Surface: ☐ Dirt ☐ Wood ☐ Concrete ☐ Lined w/ \_\_\_\_\_

Control: ☐ Gate ☐ Valve ☐ Flow can either be Shut off or Bypassed

From: ☐ Stream Diversion ☐ Pump ☐ Reservoir ☐ Other \_\_\_\_\_

#### Findings:

- ☒ a. The intake works were not inspected.
- ☐ b. The intake works were not tested.
- ☐ c. The intake works appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☐ d. The intake works appeared to be in fair to poor condition and requires corrective action.
- ☐ e. The intake works appeared to be in unsatisfactory condition, urgent corrective action is required.

#### Corrective Actions:

- ☐ f. The intake works needs maintenance and/or repair. Description: \_\_\_\_\_
- ☐ g. \_\_\_\_\_

**5. Upstream Slope:****(Typical Slope  $\pm$  1 : 1.5 to 2 )**

Slope Protection: ☐ None ☐ Dumped Rock ☐ Fitted Rip Rap ☐ Grouted Rip Rap ☐ Liner \_\_\_\_\_ ☐ Other: \_\_\_\_\_

☐ Defect in Protection: Description: Could not see slope because of dense vegetation.

Erosion: ☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6" deep) ☒ Not Visible ☐ None Observed

Description: \_\_\_\_\_

Cracks: ☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible ☒ Not Visible ☐ None Observed

Description: \_\_\_\_\_

Sinkholes: ☐ # Observed: \_\_\_\_\_ Size: \_\_\_\_\_ and \_\_\_\_\_ Depth ☒ Not Visible ☐ None Observed

Description: \_\_\_\_\_

Vegetation: ☐ None ☐ Low Ground Cover ☒ Bushes or Tall Grass ☐ Trees # \_\_\_\_\_ ☐ <6" ☐ >6" & <20" ☐ >20"

Description: Lots of brush covering the slope. Cannot inspect slope. Brush up to 10 feet tall.

**Findings:**

- ☐ a. The upstream slope was not inspected.
- ☐ b. The upstream slope appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☒ c. The upstream slope appeared to be in fair to poor condition and requires corrective action.
- ☐ d. The upstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.

**Corrective Actions:**

- ☐ e. Slope protection needs maintenance or repair. Description: \_\_\_\_\_
- ☐ f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description: \_\_\_\_\_
- ☐ g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.
- ☐ h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.
- ☒ i. The upstream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.
- ☐ j. Tree(s) were observed on the dam embankment. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.
- ☐ k. \_\_\_\_\_

**6. Crest:** Approximate Crest Width: 15'

Access: ☐ None ☐ Walking Path ☒ Roadway, Surface / Width / Usage: Dirt road

Erosion: ☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6" deep) ☐ Not Visible ☒ None Observed

Description: \_\_\_\_\_

Cracks: ☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible ☐ Not Visible ☒ None Observed

Description: \_\_\_\_\_

Sinkholes: ☐ \_\_\_\_\_ in. Wide ☒ \_\_\_\_\_ in. Long ☒ \_\_\_\_\_ in. Deep ☐ Not Visible ☒ None Observed

Description: \_\_\_\_\_

Vegetation: ☐ None ☒ Low Ground Cover ☐ Bushes or Tall Grass ☐ Trees # \_\_\_\_\_ ☐ <6" ☐ >6" & <20" ☐ >20"

Description: Brush less than 12" high.

**Findings:**

- ☐ a. The dam crest was not inspected.
- ☐ b. The dam crest appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☒ c. The dam crest appeared to be in fair to poor condition and requires corrective action.
- ☐ d. The dam crest appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.

**Corrective Actions:**

- ☐ e. Access along the crest was satisfactory.
- ☐ f. Access along the crest was not possible. Description: \_\_\_\_\_
- ☐ g. Rut and/or Gully erosion was observed on the crest, which requires maintenance and/or repair. Description: \_\_\_\_\_
- ☐ h. A crack was observed on the crest, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.
- ☐ i. A sinkhole was observed on the crest, which requires further investigation to determine the underlining cause. Repair and monitor the area.
- ☒ j. Portions of the crest were not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.
- ☐ k. Tree(s) were observed along the dam crest. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.
- ☐ l. \_\_\_\_\_

**7. Downstream Slope:****(Typical Slope  $\pm$  1 : 2\* )**Access: ☐ lower roadway along toe ☐ roadway to outlet works ☒ walkway to outlet works ☐ None ObservedSlope Protection: ☒ None ☐ Dumped Rock ☐ Rip Rap ☐ Grouted Rip Rap ☐ Concrete \*On Lower slopeErosion: ☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6" deep) ☐ Not Visible ☒ None Observed

Description: \_\_\_\_\_

Cracks: ☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible ☐ Not Visible ☒ None Observed

Description: \_\_\_\_\_

Sinkholes: ☐ \_\_\_\_\_ in. Wide ☒ \_\_\_\_\_ in. Long ☒ \_\_\_\_\_ in. Deep ☐ Not Visible ☒ None Observed

Description: \_\_\_\_\_

Vegetation: ☐ None ☐ Low Ground Cover ☒ Bushes or Tall Grass ☒ Trees # 3+/- ☐ <6" ☒ >6" & <20" ☐ >20"Description: Brush, trees on earth slope; vines on rock wall.Seepage: Seep Spot Number 1☐ Green Vegetation ☒ Wet or Muddy Ground ☐ Ponding Water ☐ Not Visible ☐ None Observed☐ Flowing, Description: \_\_\_\_\_Water Clarity: ☒ Clear ☐ Some particles ☐ Muddy ☐ Other: \_\_\_\_\_Description: Through-seepage observed on the lower earth slope at the valley bottom.Seep Spot Number 2☐ Green Vegetation ☐ Wet or Muddy Ground ☐ Ponding Water ☐ Not Visible ☐ None Observed☐ Flowing, Description: \_\_\_\_\_Water Clarity: ☐ Clear ☐ Some particles ☐ Muddy ☐ Other: \_\_\_\_\_

Description: \_\_\_\_\_

**Findings:**

- ☐ a. The downstream slope was not inspected.
- ☐ b. The downstream slope appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☒ c. The downstream slope appeared to be in fair to poor condition and requires corrective action.
- ☐ d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.

**Corrective Actions:**

- ☐ e. Slope protection needs maintenance or repair. Description: \_\_\_\_\_
- ☐ f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description: \_\_\_\_\_
- ☐ g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.
- ☐ h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.
- ☒ i. The down stream slope was difficult to inspect due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection. Remove vegetation.
- ☒ g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.
- ☐ h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.
- ☐ i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining cause and take corrective action. Monitor the area.
- ☐ j. The slope was very steep, around a 1 to 1 slope, further study is required to verify slope stability.
- ☒ k. Structural engineer should evaluate the condition and stability of the rock wall.

## 8. Abutments/Toe:

Erosion: ☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6" deep) ☐ Not Visible ☒ None Observed  
Description: \_\_\_\_\_

Cracks: ☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible ☐ Not Visible ☒ None Observed  
Description: \_\_\_\_\_

Vegetation: ☐ None ☐ Low Ground Cover ☒ Bushes or Tall Grass ☐ Trees # \_\_\_\_\_ ☐ <6" ☐ >6" & <20" ☐ >20"  
Description: Vegetation okay on private land. Dense vegetation on State owned land.

Seepage: Seep Spot Number 1  
☐ Green Vegetation ☒ Wet or Muddy Ground ☒ Ponding Water ☐ Not Visible ☐ None Observed  
☐ Flowing, Description: Total amount of seepage was 30 to 50 gpm.  
Water Clarity: ☒ Clear ☐ Some particles ☐ Muddy ☐ Other: \_\_\_\_\_  
Description: Light to moderate seepage at toe on left abutment, right abutment, and valley floor.

Seep Spot Number 2  
☐ Green Vegetation ☐ Wet or Muddy Ground ☐ Ponding Water ☐ Not Visible ☐ None Observed  
☐ Flowing, Description: \_\_\_\_\_  
Water Clarity: ☐ Clear ☐ Some particles ☐ Muddy ☐ Other: \_\_\_\_\_  
Description: \_\_\_\_\_

### Findings:

- ☐ a. The abutments/toe were not inspected.
- ☐ b. The abutments/toe appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☒ c. The abutments/toe appeared to be in fair to poor condition and requires corrective action.
- ☐ d. The abutments/toe appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.

### Corrective Actions:

- ☐ e. Slope protection needs maintenance or repair. Description: \_\_\_\_\_
- ☐ f. Rut and/or Gully erosion was observed, which requires maintenance and/or repair.  
Description: \_\_\_\_\_
- ☐ g. A crack was observed along the abutments/near the toe, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.
- ☒ h. The abutment/toe area was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection. **Clear vegetation on state owned land.**
- ☐ i. Tree(s) were observed along the abutment/toe. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.
- ☒ j. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.
- ☐ k. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining cause and take corrective action. Monitor the area.
- ☐ l. \_\_\_\_\_

## 9. Outlet Works:

Culvert / Pipe

Type / Size: one conduit

Culvert: ☐ Concrete ☐ Masonry ☒ unlined earth ☐ Other \_\_\_\_\_

Pipe: ☐ DIP ☐ Corrugated Metal ☐ PVC ☐ HDPE ☐ Concrete ☐ Other \_\_\_\_\_

Control Type: ☒ Gate ☐ Valve ☐ Other \_\_\_\_\_

Location: ☒ Control on Upstream side ☐ Control on Downstream side

Seepage: ☐ Green Vegetation ☐ Wet or Muddy Ground ☐ Ponding Water ☐ Not Visible ☒ None Observed

☐ Flowing, Description: \_\_\_\_\_

Water Clarity: ☐ Clear ☐ Some particles ☐ Muddy ☐ Other: \_\_\_\_\_

Description: \_\_\_\_\_

### Findings:

- ☐ a. The outlet works were not inspected.
- ☐ b. The outlet works were not tested.
- ☒ c. The outlet works appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☐ d. The outlet works appeared to be in fair to poor condition and requires corrective action.
- ☐ e. The outlet works appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.

### Corrective Actions:

- ☐ f. Seepage/Ponding water was observed. Conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.
- ☐ g. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil. Conduct further investigation to determine the underlining cause and take corrective action. Monitor the area. Failures caused by seepage/piping along the outlet conduit are very common and are considered to be a dangerous situation.
- ☐ h. Were not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.
- ☐ i. Tree(s) were observed on the dam embankment. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.
- ☐ j. \_\_\_\_\_

## 10. Spillway:

Type: ☐ None ☐ Culvert/Pipe ☒ Channel  
Description: Unlined channel.

Dimension: 50' long ft. Invert elevation: \_\_\_\_\_ ft. per staff gage

Slope Protection: ☒ None ☐ Grass ☐ Dumped Rock ☐ Fitted Rip Rap ☐ Grouted Rip Rap ☐ Concrete  
☐ Defect in Protection: Description: \_\_\_\_\_

Approach: ☐ Clear ☒ High Veg. ☒ Trees ☐ Other: \_\_\_\_\_

Erosion: ☐ Scour ☐ Gully ☐ Headcut ☒ Not Observed ☐ Other: \_\_\_\_\_  
Description: \_\_\_\_\_

Vegetation: ☐ None ☒ Low Ground Cover ☒ Bushes or Tall Grass ☐ Trees # \_\_\_\_\_ ☐ <6" ☐ >6" & <20" ☐ >20"  
Description: Grasses, brush, trees

### Findings:

- ☐ a. The Spillway appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☐ b. The Spillway appeared to be in fair to poor condition and requires corrective action.
- ☒ c. The Spillway appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.

### Corrective Actions:

- ☐ d. Slope protection needs maintenance or repair. Description: \_\_\_\_\_
- ☒ e. The spillway approach was blocked. Clear approach.
- ☐ f. Severe scour erosion was observed which requires maintenance and/or repair.  
Description: \_\_\_\_\_
- ☐ g. A headcut was observed downstream of the spillway. Corrective / mitigative action is required to prevent this problem from moving upstream.
- ☒ h. Trees are unacceptable in the spillway channel and approach. Take corrective action to address the woody vegetation problem and repair the damaged area.
- ☐ i. Unclear if spillway is adequately sized. Spillway should pass the probable maximum flood. Verify spillway capacity and take corrective action as required.
- ☒ j. Grading and cattle traffic have caused the spillway to flow along toe of dam along the right abutment. Owner need to regrade exit channel so spillway flows away from the dam. ***This is considered an urgent corrective action.***

## 11. Down Stream Channel:

Name: \_\_\_\_\_

Downstream: ☐ Sump ☐ Open Area ☐ Un-Defined Drainage-way ☐ Defined Drainage-way ☐ Other \_\_\_\_\_

Items along Stream Bank: ☐ None ☐ Road ☐ Houses ☐ Town ☐ Not Inspected

Description: \_\_\_\_\_

### Findings:

- ☒ a. The downstream channel was not inspected.
- ☐ b. The downstream channel appeared to be in satisfactory condition, no corrective actions are required at this time.
- ☐ c. The downstream channel appeared to be in fair to poor condition and requires corrective action.
- ☐ d. The downstream channel appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.

### Corrective Actions:

- ☐ e. \_\_\_\_\_

## **Additional Comments:**

## **FINDINGS:**

**Conclusion:** On the date of this limited visual inspection, there appeared to be no immediate threat to the safety of the dam. No assurance can be made regarding the dam's condition after this date. Subsequent adverse weather and other factors may affect the dam's condition.

**Urgent corrective action:** Redirect spillway flows away from the toe of the dam. Redirect flows back into the original spillway exit channel.

**Short term Recommendations:** Routinely monitor seepage along the toe of dam. Monitor for changes in condition and quantity of seepage.

### **Long term recommendations:**

1. The upstream and downstream slopes and crest of the embankment should be clear and visible for inspection. Underbrush should be cleared and grasses kept short. Trees have been allowed to grow so large in some cases that there is concern that seepage along the root systems may develop. There is additional concern that cutting and killing the trees will lead to rotten roots and greater potential for seepage. A more in depth evaluation of the vegetation conditions should be performed to determine how best to remediate the condition.
2. A path or roadway along the groins, toe, and to the outlet works should be cleared and maintained to facilitate periodic inspection, maintenance, and monitoring of seepage conditions.
3. Seepage was observed along the downstream toe of the dam. The rate of seepage should be measured with a V-notch weir or Parshall flume. The rate of seepage should be measured with respect to the reservoir pool elevation.
4. A seepage study should be conducted by a geotechnical engineer to determine the stability of the dam with regards to seepage in the foundation and through the embankment.
5. The dam owner should have a structural evaluation conducted on the rock wall to determine the current condition and stability of the wall.

## **Limitations and Intent of this Dam Safety Inspection:**

This Dam Safety Inspection was conducted to assess the general overall condition of the reservoir/dam, identify visible deficiencies, and recommend areas of for monitoring, additional investigative studies and corrective actions. The inspection is based only on visible features/areas of the dam on the day of inspection. This inspection is not a formal phase I or phase II dam safety inspection and does not include a review or evaluation from each specialist of an inspection team, such as a geologists, civil, geotechnical, structural, or hydraulics engineer. The owner should verify the findings of this report and take corrective actions. The owner may submit to the State alternative corrective actions that are certified by a licensed professional engineer in the State of Hawaii experienced in the design and construction of dams. This inspection does not relieve the owner/operator from their responsibility to conduct routine inspections, maintenance, repairs, modifications, monitoring, documentation, and/or investigative studies. The inspection was conducted under the authority of the Hawaii Revised Statutes Chapter 179D, and Hawaii Administrative Rules, Title 13, Chapter 190, titled "Dams and Reservoirs". Questions regarding this inspection should be forwarded to the Hawaii State Dam Safety Program; PO Box 373; Honolulu, Hawaii 96809; Ph. (808) 587-0236.



HI00011 - Aii Reservoir: View of the crest of dam. Note the thick vegetation.



HI00011 - Aii Reservoir: View of potential spillway flow path along downstream toe of the dam. Dam is located on left side of the photo.



HI00011 - Aii Reservoir: View of potential spillway flow path along downstream toe of the dam.



HI00011 - Aii Reservoir: View of the rockwall on the downstream face of dam. Photo is turned 90 degrees counterclockwise.